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*APPLICATION*  
*FOR*  
*UNITED STATES LETTERS PATENT*

**Title:** Method and Apparatus for Vending a Containerized Liquid Product Utilizing  
an Automatic Self-Service Refill System

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METHOD AND APPARATUS FOR VENDING A CONTAINERIZED LIQUID PRODUCT  
UTILIZING AN AUTOMATIC SELF-SERVICE REFILL SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of co-pending United States application serial  
5 number 09/396,574 filed September 15, 1999, the contents which are incorporated herein by  
reference in entirety.

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention pertains to dispensers generally, and more particularly to dispensers that are  
10 controlled responsive to indicia upon a fluid receptacle to dispense a particular product mixture.

2. DESCRIPTION OF THE RELATED ART

Various commercial establishments, including supermarkets and many other diverse outlets,  
sell a wide variety of fluid products in various containers. A specific example of a fluid product is  
a liquid laundry detergent sold in relatively large plastic containers having a screw-type cap or  
15 closure. Consumers of such liquid products frequently discard the containers after using the contents.  
The discarded empty containers then migrate into a waste disposal area such as a landfill.

If an alternate system were used whereby a customer would bring back the empty original  
container to the commercial establishment for refilling the container, using a user friendly method  
as will be described below in connection with the present invention, then the following benefits may  
20 be attained:

1. The commercial establishment can profitably vend or sell the liquid product for refilling at a price significantly lower than the original sales price. The lower price will financially motivate the customer to return with the empty container for refilling. The commercial establishment will use relatively low-cost bulk quantities of the liquid product for refilling, which helps to maintain a strong profit margin for the commercial establishment.

2. Refilling and reuse of containers breaks the cycle of "use and discard", which keeps empty containers out of the landfills with obvious benefit to society.

3. Delivery of bulk product directly to consumer illustrated herein requires less handling labor and shipping-type packaging materials than traditional methods, further reducing cost and landfill waste production.

4. Bulk packaging reduces the retail shelf space required for display/delivery of product to a customer. Where consumer packaging tends to be relatively inefficient at using precious retail shelf space, bulk dispensers illustrated herein offer space/product ratio improvement.

5. Appropriate dispensing options in accord with the present invention enable dispensing a nearly unlimited combination of base and optional ingredients into a consumer's container. The more options presented to a consumer in the traditional prepackaged environment, the more precious retail shelf space that is required. Consequently, in the prior art the consumer's product choices were extremely limited.

Thus the present invention provides financial benefits to both commercial establishments/vendors and consumers/customers, while also facilitating a reduction in solid waste as a benefit to society and enabling a broader selection of product choices to meet a particular customer's needs.

U.S. Patent 4,929,818 to Bradbury, et al., discloses a method and apparatus for vending a

containerized product on multiple occasions. In the Bradbury patent, a customer initially purchases a fluid-filled container with a bar code that indicates the price of the container. Upon emptying the container, the customer returns to the store and refills the container at a refill station. The refill station modifies the bar code on the container to indicate that the container has been refilled. Thus, when the customer checks out, he or she is only charged for the refill, and not the container. A major disadvantage of the system disclosed in U.S. Patent 4,929,818 is that it does not read the bar code at the time of filling, limiting the Bradbury et al invention to a single product. Nevertheless, it still requires a relatively complex apparatus for modifying the bar code on the container to indicate that the container has been refilled. This complexity has been avoided in the present invention, while simultaneously enabling a much more diverse range of products to be dispensed.

#### SUMMARY OF THE INVENTION

In broad terms, the present invention provides a method of vending a fluid product to a customer utilizing an original container. Parenthetically, at the time of the original purchase of the original container, the container has thereon a machine-readable indicia such as a bar code or the like indicative of the product and of the original sales price of the container as filled with the product. After the original container has been emptied of the product, then the invention provides for multiple refillings of the product into the original container. The machine-readable indicia on the container is utilized to actuate the refilling of the container and, after each refilling of the container, the method dispenses to the customer a discount coupon to be presented to the vendor's check-out station, together with the refilled container, whereby the price charged to the customer by the vendor is the original sales price associated with the bar code, less the value of the discount coupon.

Another important aspect of my invention is that the basic concept can be expanded to

provide for the vending of a plurality of containerized products respectively into a plurality of original refillable containers from a single dispensing station. For this case, each of the original refillable containers for a plurality of originally vended products, each of which may be of different diameters or shapes, has a unique machine readable indicia thereon indicative of the liquid product in the original refillable container, and the original sales price prior to the first refilling. For each refilling of a selected refillable container with the matching product, a discount coupon is dispensed to the refill customer which may be presented to the vendor's customer checkout station, together with the matching refilled container.

Another important aspect of my invention is that the fluid refilling method includes a vertically oriented filling pipe or probe having an outlet and being positioned over a filling opening in an original container. The probe is adapted to be vertically moveable with respect to the original container and is sized to freely enter the filling opening. The filling probe is inserted into the refillable container through the opening, until the outlet is adjacent the bottom of the refillable container. Next, the container is filled with a preselected volume of the fluid product, and, most preferably, the dispensing tip is progressively raised as the container is filled. This inventive feature prevents foaming as the container is being filled, since the liquid is not exposed to the air during entry into the container. Potential splashing and the probability for spills are also eliminated. The present invention thereby avoids consumer contact with messy and potentially hazardous substances which might otherwise result from overflow, suds, spills and splashes.

Yet another important advantage of the present invention is the preservation of brand identity and loyalty with the container, through multiple refills. A consumer cannot fill a container without the original label, nor can the product be scanned at check-out. Consequently, the product within the container is always properly labeled with the original label, thereby ensuring brand identity

remains with the container through each refill. Furthermore, the customer has price incentive to maintain brand loyalty, since the refill will always be discounted relative to a new competitor product. Finally, any special instructions, hazards or chemical ingredient lists will also be preserved, in the event of an accidental poisoning or the like, thereby preserving the promotion of safe use of the product.

Another aspect of my invention is to provide an additional marketing function in connection with either single product or multiple product dispensers discussed herein, by dispensing to the refill customer, at the time of dispensing a discount coupon, at least one additional coupon or promotional message.

Another advantage of the present invention is that it can be linked to an inventory control management system whereby data is collected on the volume, on a product-by product basis, of sales of fluid products to permit a supplier to automatically restock products at the appropriate time, and/or permit the retailer to automatically order from the supplier at the appropriate time.

Yet another advantage of the present invention is the ability to include affiliate codes on the container label, for crediting or compensating an affiliated entity with refills associated in some way with that affiliate.

A further advantage of the present invention is the ability to provide custom scents, flavors, nutritional supplements and the like to an otherwise standard product, without detriment to the functionality of the product and with only slightly greater complexity and space required within the dispensing machine.

Yet a further advantage is the increased visibility obtained by a product packaged and sold through the novel dispenser, since the monitor is substantially more visible with display screen when contrasted to the many bottles along a store shelf. Consequently, precious visual attraction at a retail

location is obtained by the preferred embodiment over conventional packaging.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, advantages, and novel features of the present invention can be understood and appreciated by reference to the following detailed description of the invention, taken in conjunction  
5 with the accompanying drawings, in which

Figure 1 is a schematic representation of a refill station designed in accordance with the teachings of the present invention.

Figure 2 is a perspective view of a refill station cabinet designed in accord with the teachings of the present invention.

10 Figure 3 is a block diagram of an inventory control system that may be used in conjunction with the present invention.

Figure 4 is a partial view of the refill station of Figure 1, with the filling pipe or probe 30 moved down and into container AA.

15 Figure 5 is a view of an expanded refill station showing a total of six liquid storage containers for use, in one embodiment, with the apparatus of Figure 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

20 Figures 1 and 2 depict an apparatus for vending at least one fluid product, such as a liquid cleaning product. Other types of products are contemplated herein, including but not limited to shampoos, conditioners, hand soaps, lotions, water based beverages, water, "smart foods" that include custom blends of nutritional supplements within the food or beverage, and the like. In fact, any material which is sufficiently fluent, whether solid, liquid or gaseous, may be dispensed through

an apparatus such as refill station 130, provided each of the components described herein below are designed to accommodate the material.

Self-service refill station 130 is designed to reduce cost and waste by reusing a consumer's bottle or other fluid container AA. It should be understood that the concepts of the present invention are applicable for vending two or more different proprietary fluid products, as will be explained herein below. Thus, for one vending scenario, a consumer purchases one of ten different proprietary cleaning products. When container AA is empty, the consumer brings it to a store that has a refill station 130. Container AA is inserted in chamber 12 and refill station 130 reads a code 20 on the label to identify the type and quantity of cleaner. Refill station 130 then blends and dispenses the same product that is identified by code 20. For this scenario, the products consist of one of five different concentrates dispensed selectively in full concentration or mixed with varying quantities of filtered water.

Container AA is preferably manufactured from a durable translucent plastic with a removable cover, though the specific construction, materials and geometry of container AA is not critical to the performance of the invention. The shape of container AA is however selected most preferably to facilitate proper centering and orientation within fill chamber 12. Additional considerations are that code or indicia 20 be durable, colorfast, and positionable correctly and consistently toward code reader 22, to enable accurate readings to be taken. The footprint and diameter of varying capacity containers is preferably similar enough so as to facilitate centering under a fill-spout such as fill-probe 31. The mouth of container AA must be sufficiently wide for ease of receiving fill-probe 31.

One implementation for the foregoing that provides simple product handling by the consumer is to provide a turntable within fill chamber 12 to support container AA. The turntable may then be automatically rotated after the consumer has closed chamber 12, allowing container AA to be



scanned for bar codes irrespective of orientation. Where container AA is round, such a turntable can be round and have concentric circles to help center varying sizes of bottles, while allowing a central drain. Other shapes and configurations will be apparent to those skilled in the art upon a reading of the present disclosure.

5 Referring to Figure 2, a refilling cabinet is depicted as a floor-supported refill station 130 having a front panel 10 and a side panel 11. Fill chamber 12 extends inwardly from a midsection of front panel 10 and has a perforated bottom or drain shelf 13 for receiving and supporting an empty bottle or container AA. Door 14 may preferably be provided for closing chamber 12 to prevent a customer or operator from accidentally interfering with the operation of refill station 130. In this case, a door latch and interlock 14A on front panel 10 holds or retains door 14 and also is an element of the filling control circuit. A start button 15, discount coupon dispensing means 18 and one or more visual message means 16 and 17 of various or appropriate size and electronic construct, such as LED, LCD, CRT or other known display or messaging devices are also provided on the front panel 10 of the cabinet.

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15 In an alternative embodiment to the use of start button 15, and preferred for many consumer applications, door latch and interlock 14A is used instead of start button 15. In this embodiment, the initiation of refill station 130 occurs immediately upon closure of door 14. In such case, appropriate logical control is provided to ensure proper sequential checks prior to dispensing, including but not limited to the closure of interlock 14A, the detection of a container having appropriate label, and determination that container AA is not already full.

20 Referring to Figure 1, the chamber 12 is depicted as having a lower surface 12' with its integral perforated section 13 and an upper or top surface 12". Empty container AA is depicted positioned resting on surface 13 with a neck-down portion 24 terminating in an opening 26 at the

top thereof. An overfill sensor 27 is fixed to chamber 12 and is positioned adjacent top 26 of container AA.

Container AA has machine-readable indicia 20 thereon. For an example as depicted, there are four separate indicia marks 20 which are adapted to be sensed by four sensors 22 attached to the chamber 12 for the purpose of identifying the type and quantity of the liquid product originally vended in container AA. Nevertheless, a myriad of known machine-readable indicia and sensors are known and contemplated herein, including but not limited to bar code readers and other optical sensors, magnetic sensors, and so forth.

Fill-probe 30 is vertically positioned above container AA and is adapted in preparation for a fill cycle to be moved vertically from the position shown in Figure 1 to the position shown in Figure 4, with the spout of discharge end 31 of probe 30 as shown in Figure 4 adjacent to the bottom of container AA. Thus, fill-probe 30 has an outside diameter preselected to permit insertion through top opening 26 of container AA and thence downwardly in. This arrangement facilitates refilling container AA with a minimum of foaming. In the preferred embodiment fill probe 30 will be raised up during dispensing, through a continuous motion, series of timed steps, or other suitable control to thereby ensure that only the tip of fill-probe 30 is contacting the liquid as the liquid level rises within container AA.

Fill-probe 30 is supported for the aforesaid vertical movement with respect to container AA by a pair of guide-bushings 33 and 34 shown in Figure 1. The top (as shown in Figure 1) portion of fill-probe 30 is identified by reference numeral 30' and has a longitudinally extending rack-gear 30" which is adapted to be engaged by a pinion gear 36 driven by a motor-slip-clutch means 35. Thus, when motor-slip-clutch 35 is energized in one sense it will cause the rotation of pinion gear 36 so as to drive the rack-gear 30" and thus fill-probe 30 downwardly as shown in Figure 1 to the position

shown in Figure 4. A reverse energization of motor-slip-clutch 35 will retract fill-probe 30 to the position shown in Figure 1.

Rigidly attached to fill-probe 30 are brackets 40, 45, and 50, on which are mounted suitable valve and flow control means 41, 46 and 51 respectively. Each of the units 41, 46 and 51 have a discharge conduit extending inside of the fill-probe 30. Thus, valve and flow control 41 has a conduit 42 extending into fill-probe and extending down to a discharge opening 42' adjacent the nozzle 31 of fill-probe 30. In the same manner, units 46 and 51 have conduits 47 and 52, terminating respectively in discharge ports 47' and 52' within fill-probe 30.

Flexible fluid lines 64, 74 and 84 are connected respectively to inlet means of the valve and flow control units 41, 51 and 46. In an alternative embodiment, valve and flow control units 41, 51 and 46 may be eliminated, and timing and level detection by overfill sensor 27 used to control the flow from particular bulk liquid containers such as containers 60, 70, 80. Additional safety may be provided through timing to ensure the machine does not run beyond reasonable limits.

Suitable pressure switches 43, 53 and 48 are connected to the flexible fluid lines 64, 74 and 84 respectively. The flexible fluid lines 64, 74 and 84 are connected to the output of suitable pumps 62, 72 and 82 respectively, which are associated with bulk liquid containers 60, 70 and 80 respectively.

The arrangement depicted in Figure 1 is for a typical scenario where container 61 contains a dish-detergent having a high viscosity, container 71 contains filtered water, and container 81 contains a low-viscosity concentrate. Pump 62 has an inlet conduit 63 extending to the lower portion of container 61. The bottom of conduit 63 is identified by reference numeral 63'. Likewise, pump 72 has a conduit 73 with a lower end 73', and pump 82 has a conduit 83 with a lower end 83' extending to near the bottom of containers 71 and 81 respectively.

Within chamber 12 is a collector 12A concentrically positioned about the lower end 31 of fill-probe 30 that functions to collect any errant fluid that might be on the outer surface of fill-probe 30. Errant fluid is collected, and then removed via a suitable tube 12B, adapted to discharge into a drain pan 12C.

5 When container AA is filled to the proper level as sensed by overfill sensor 27 or other flow measuring techniques, then a control system functions to stop pumps 62, 72, 82; to retract fill-probe 30; and to dispense at least one discount coupon at 18 for the customer. In some cases, for marketing reasons as an example, the machine may dispense, in addition to the discount coupon, another coupon relating to another product or promotion, or other marketing-related papers such as cleaning tips or the like to help promote affiliated products. At the time of retraction of fill probe 30, and depending upon the particular configuration of contents that are being dispensed into container AA, it may be desirable to release a very small amount of water to rinse fill probe 30, thus preparing fill probe 30 to dispense other compositions with a minimum of cross-contamination. While this will most preferably be done at the completion of the fill cycle while container AA is still under probe 30, there may also be instances where the customer will first remove container AA and then probe 30 self-cleans.

As indicated, the scenario depicted in Figure 1 may be for a single fluid product, such as for exemplary purposes only and without limitation to the scope of the invention, a proprietary-cleaning product. Figure 5 depicts an expansion of the arrangement shown in Figure 1 where not only the bulk storage containers 60, 70 and 80 have been depicted but, in addition three additional bulk storage containers 90, 100 and 110, containing, respectively, products X, Y and Z. Containers 90, 100 and 110 comprise in part, respectively, pump means 92, 102 and 112. It will be understood that pumps 92, 102 and 112 each would be connected to fill-probe 30 through flexible fluid lines, valve and flow

control units, and discharge conduits within fill-probe 30 similar to those associated with pumps 62, 72 and 82.

Thus, in operation, sensors 22 will respond to indicia 20 on container AA to uniquely identify the type and quantity of cleaner for that specific container. Then a control means, such as but not limited to a micro-controller, microprocessor or the like together with necessary relays or interface, will selectively actuate the appropriate pumps and any valve and flow control means. For the scenario depicted in Figure 1 pumps 62, 72 and 82 are actuated, as are their respective valve and flow controls 41, 51 and 46. The valve and flow control means are controlled so as to provide the proper blending of the three liquids being pumped through the flexible fluid lines 64, 74 and 84 into fill-probe 30 and thence into container AA.

For a different proprietary product, e.g., X, the system control would cease utilizing liquid from tank 61, and commence using product from tank 90. While a particular number of tanks are illustrated herein, the invention is not so limited. Further features are contemplated herein, including the dispensing of a wide variety of fluent materials, and not solely limited to liquids. Further, the tanks are not limited to base materials such as detergents, but tanks may be provided containing a variety of scents, colorants, flavorings and nutritional supplements for edible compositions and the like. When optional ingredients are provided, one considered embodiment of the present invention is to use displays such as 16, 17 to poll a customer regarding the inclusion of these options. This may take the form of questions or option lists that determine whether, for exemplary purposes only, a particular cleaner should be unscented, pine, lemon, or the like. Based upon the customer's feedback, through switches, keypads or other known input devices, the particular ingredients may then be calculated and dispensed from each of the appropriate tanks.

It will also be understood that the invention, shown in Figure 2 as floor supported, may be

configured for a support located above a floor such as a counter top, shelf or the like. The specific dimension, geometry or support of refill station 130 is not critical to the performance of the invention, though a preferred embodiment has been illustrated herein as required.

Another aspect of the invention is schematically shown in Figure 3 wherein information generated at refill station 130 concerning the quantity of bulk liquids utilized is made available both to retailer 140 and to bulk supplier 150. This information can be very useful and cost effective for purposes of inventory control. In one mode, supplier 150 of bulk liquid products may receive the information from refill station 130 and, pursuant to prior agreement, automatically maintain adequate fluid supplies at refill station 130. Alternately, retailer 140 may maintain control over the ordering of supplies by receiving the information from refill station 130 and then, as appropriate, order from the supplier 150 additional stock for the system.

Yet another aspect of the invention derives from that illustrated in Figure 3. Not only can information be exchanged between retailer 140 and bulk supplier 150, but similar information may also be exchanged between affiliated entities. These affiliates may include individuals, businesses and non-profit entities, for example, that may assist in one way or another with the production, promotion or actual sale of bulk products from refill station 130 or containers such as container AA. For example, a school or charitable organization may use either full or empty containers AA in a fund-raising activity. The particular organization is assigned a unique code or indicia 20, such as a combined bar code that identifies not only the desired contents for container AA, but also an affiliate code. Credits, financial or otherwise, are in this embodiment assigned to the affiliate at the time of each filling of container AA. In the case of a fund raising activity, the credits would most likely be financial payments made based upon the numbers and types of fills. Clearly, the application of this technique extends to many inter-organizational activities and affiliations. Sales

associates, service bureaus, brand licensors, and others may all be accounted to through the present method.

While the preferred embodiment of the invention has been illustrated, it will be understood that variations may be made by those skilled in the art without departing from the inventive concept.

5 Accordingly, the invention is to be limited only by the scope of the following claims.